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ENCHYTRÆIDÆ (OLIGOCHÆTA) FROM THE ROCKY MOUNTAIN REGION*

By PAUL S. WELCH

For certain groups of animal life, North America is still in reality an unexplored territory. Of the vast region extending from the Mississippi River to the Pacific and from the Isthmus to the Arctic Ocean, excluding a narrow, coastal strip from Mexico to Alaska, nothing has hitherto been known concerning the Enchytræidæ although there is every reason to believe that their distribution includes the entire area. The tendency of this family of Oligochæta to be northern in its distribution is well established and some of its representatives are known to thrive under alpine conditions, both in Europe and North America. The two species discussed in this paper were found in high altitudes of the Rocky Mountain system—mere chance representatives, no doubt, of a large indigenous enchytræid fauna which awaits study.

Mesenchytræus altus n. sp.

The following study has been made on material collected by Professor Frank Smith near Corona, Colorado, close to the edge of a small lake on the east side of Mt. Epworth. This lake, known locally as "Pumphouse Lake," is less than a mile from the point where the Moffat railroad passes over the crest of the "Divide," via Rollins Pass, and has an altitude of about 11,300-11,400 feet. The specimens, secured July 18, 1916, at and under the edge of a big snow-field close to the north end of this lake, contained twenty-nine sexually mature enchytræids and nineteen others in various stages of immaturity. All of the specimens were collected in moss and under old wood. They occurred in such abundance that the possible rate of collection was estimated at 50-100 per hour. Under the conditions of their habitat, they were sluggish, but responded to

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contact stimuli and crawled slowly when disturbed. Although none of them was found on or in the snow, they occurred in abundance under it. While these worms cannot strictly be included with the "glacier worms" described from certain other parts of the Rocky Mountain region, yet it appears that their habitat represents, in part, a combination of the conditions of the snow-field and the terrestrial environments.

Definition.—Length, 13-21 mm.; average, 17.5 mm. Diameter, about 0.61 mm. Somites, 58-73; average, 63.7. Color of alcoholic specimens, yellowish to light brown. Prostomium blunt, smooth, rounded. Head pore at tip of prostomium. Setæ sigmoid; approximately uniform in size and shape; 5-8 in ventral bundles in anteclytellar region, 3-5 in lateral bundles; 2-5 in ventral bundles in postclytellar region, 2-3 in lateral bundles. Clitellum distinctly developed, on XII-XIII. Brain about twice as long as wide; lateral margins almost parallel; anterior and posterior margins distinctly emarginate. Origin of dorsal blood-vessel in XVIII; small cardiac body present. Nephridia of usual mesenchytræid type; small anteseptal, and large, irregular postseptal part; origin of efferent duct on ventro-caudal surface of latter. Spermiducal funnel large, contorted; about five times as long as diameter; collar absent. Sperm duct very long, extending caudad within ovisac to XIX; much contorted throughout entire length; diameter approximately uniform. One pair of ovisacs extending from XII/XIII to XXII-XXVI; both independent from origin; contain sperm sacs and sperm ducts. One pair of sperm sacs extending caudad from XI/XII to XV-XVII; vary somewhat in length; each contained within corresponding ovisac. Penial bulb large, subglobular; atrium small, eight atrial glands present; numerous groups of multicellular glands within bulb. Spermathecae elongate, extending to VII-VIII; ducts narrow, no glands at ectal openings; ampullæ long, terminations expanded; no connection with digestive tract.

The type and eight paratypes are in the collection of the writer. Paratypes have also been deposited in the collection of the United States National Museum and in the collection of Professor Frank Smith.

Affinities.—So long as a considerable number of foreign species remain so briefly described, attempts to indicate relationships must of necessity be attended by uncertainty. It appears that *Mes. altus* differs from all of the foreign forms, as they are described at present, in the possession of the enlarged and elongated spermathecæ, such organs being apparently confined to North American species. The structure of the spermathecæ puts the species into the group composed of *asiaticus*, *harrimani*, *setchelli*, *franciscanus*, *obscurus*, *maculatus*, *vegæ*, *orca*, and *gelidus*, differing from these mainly by the complete absence of diverticula. The character of the ovisacs and sperm sacs allies it with *harrimani*, *fuscus*, *fuscus* var. *inermis*, *gelidus*, and possibly certain others not described in sufficient detail to permit definite conclusions. With reference to the structure of the penial bulb, it resembles, to varying extents, *grandis*, *vegæ*, *setchelli*, *maculatus*, *obscurus*, and *eastwoodi*. It does not seem possible at present to specify with any further accuracy the affinities of this species. It should be noted that all of the above-mentioned species are known only from the Pacific coastal region of North America.

External Morphology

The body of *Mes. altus* is elongate, smooth, slender, cylindrical, and tapers slightly in the region of the two extremities. The length in the mature, alcoholic specimens varies from 13 to 21 mm., the average being 17.5 mm. In the region of the clitellum, the diameter is about 0.61 mm., the variation depending, at least in part, on the degree of body contraction. The intersegmental grooves are more distinct anterior to the clitellum and in the immediate region of the caudal extremity, but are obscure throughout the remainder of the body. The number of somites varies from 58 to 73, the average being 63.7. Certain mature specimens have only about 40, but an examination of the posterior end showed indications of loss of the terminal somites and such individuals were not regarded as representative. No pigment occurs in the body-wall or in the internal organs, the body as a whole being sub-opaque, with a slight yellowish or brownish color. The clitellum occurs on XII-XIII and is continuous on all aspects of these somites. It is well developed,

its limits are distinct in the mature specimens, and the component cells are approximately uniform in length, except in the region about the penial bulb invaginations where they are somewhat shorter. The prostomium is blunt, smooth, rounded, and bears a small, inconspicuous head pore on its apex. The setæ are distinctly sigmoid and disposed in the usual way in this genus. They are so deeply set in the body-wall that, in some cases, it was found impossible to determine accurately the number per bundle from whole, cleared specimens, owing to the fact that setæ are sometimes present but almost entirely within the body-wall. It was necessary to depend upon serial, transverse sections for accurate counts. In the ventral rows, the number of setæ per bundle varies from 5 to 8, usually 6 or 7, anterior to the clitellum, and from 2 to 5 posterior to the clitellum, usually 4 or 5. In the lateral rows, anterior to the clitellum, there are 3-5 setæ per bundle, and 2-3 per bundle behind the clitellum. Setæ are present on XIII but are not specialized. In mature specimens, the position of each penial bulb invagination is made prominent by the protruding margins.

Internal Morphology

Brain.—The brain lies in I and II, principally in the former. The length is about twice the width, a typical measurement being as follows: length, 0.126 mm.; width, 0.054. Both anterior and posterior margins are distinctly emarginate and the lateral margins are approximately parallel. Two pairs of supporting strands extend from the lateral margins to the body-wall.

Blood Vascular System.—The dorsal blood-vessel arises in XVIII and is distinctly swollen in each of the somites posterior to the clitellum. A small cardiac body is present.

Nephridia.—The nephridia are of the typical mesenchytræid type. The anteseptal part is merely a nephrostome, while the post-septal part is large, irregular, somewhat lobulate, with the efferent duct arising from the ventro-caudal surface. The organ as a whole shows a considerable amount of variation in size, shape, and general proportions.

Spermiducal Funnel.—The spermiducal funnels are conspicuous organs in the clitellar region. Each is long, cylindrical, con-

torted, of approximately uniform diameter and without a collar at the free extremity. Each funnel is about five times longer than wide and, in some of the specimens examined, extends through both XI and XII. Not only do they vary in degree of contortion but the position in the body cavity is not constant. There is a general tendency for one or both to be located caudad of the usual position. In certain specimens examined, one funnel is in the usual position while the corresponding one on the opposite side is farther caudad in XII and XIII. Specimens were studied in which both funnels are in XII and XIII. Sections showed that sometimes a funnel is shifted from its usual position in XI back into the anterior part of the sperm sac.

The sperm duct is very long, extending caudad as far as XIX. It is very much contorted throughout the entire course so that its true length is not represented by the number of somites through which it extends. Each lies in the ovisac of the same side of the body, but not within the sperm sac.

Sperm Sacs and Ovisacs.—In this species is found a pair each of sperm sacs and ovisacs which are intimately related in their mode of origin and general position. The sperm sacs are formed by caudal reflections, a right and a left, of the septum XI/XII to form two hollow tubes into which the maturing spermatozoa pass. These sacs vary in the different specimens with respect to the length and amount of distension. The two sacs of the same individual may not be equal in length. In the specimens studied, the sperm sacs extend caudad to XVI-XVII. Each sac is contained within the corresponding ovisac.

The ovisacs are extensive, hollow tubes which arise as caudal reflections, a right and a left, of the septum XII/XIII. Both are independent from the beginning and each occupies a considerable portion of the coelom, laterad and ventrad of the digestive tract. One may be longer than the other in the same specimen but both extend well caudad. In the specimens examined, the posterior extent was found to be XXII-XXVI. Each ovisac contains the sperm duct and the sperm sac for the same side of the body, and, in addition, contains the developing egg masses.

Penial Bulb.—A pair of large penial bulbs occurs in the usual position in XII. In structure, they conform to Eisen's mesenchytræid type ('05, p. 7) and consist essentially of two sets of structures, the penial bulb proper and the atrium with its associated parts. In the fully retracted condition, the two bulbs, including the penial invaginations, occupy more than one-half of the coelom in XII.

The penial bulb is situated on a deep invagination, lined by a continuation of the external hypodermis and cuticula. In transverse section of the body, this invagination is slit-like, except at the mesal extremity where it expands into a foot-shaped enlargement. The transition from the external hypodermis to the lining of the invagination is accompanied by less reduction in thickness than is the usual condition in enchytræids. The internal structure of the bulb proper has the characteristic complexity of the mesenchytræid type. Many lobular, multi-cellular penial glands occupy most of the interior, each opening into the penial invagination. They are so closely massed together that an accurate count is almost impossible. All have essentially the same structure, although considerable variation occurs in size and shape. Accessory glands appear to be absent. Numerous muscle strands radiate through the interior of the bulb, extending among the penial glands. While these glands occur throughout the organ, the majority of them lie in the dorsal and mesal parts. The usual retractor muscle extends latero-dorsad from the innermost tip of the penial invagination to the body-wall. A thin, delicate peritoneum forms the envelope for the whole organ.

The atrium unites with the penial bulb at the dorso-mesal part, opening into the penial invagination. It is only moderately developed, rather short, spindle shaped, and merges gradually with the sperm duct a short distance from the margins of the penial bulb. The greater part of the atrium is within the latter. From the ectal end, which protrudes into the penial invagination, it extends meso-dorsad through the bulb and beyond it for a very short distance, then bends caudad to meet the sperm duct. The total length is not more than that of the fully retracted penial invagination, and the maximum diameter is only about 0.08 mm. It is thick walled, the thickness being due largely to the well-developed longitudinal muscle-layer which extends the full length of the atrium. The maximum

thickness of this muscle-layer is about 0.016-0.02 mm. A narrow zone of deeply staining nuclei occurs just entad of this muscle-layer, the exact nature of which has not been determined. The lining of the lumen of the atrium is composed of a single layer of large, almost clear cells, nucleated at the bases and ciliated on the exposed surfaces. Well-developed atrial glands are present and, in the specimens examined, the number is eight. They all unite at the same level with the upper part of the atrium, each entering independently. The point of union is very close to the margin of the penial bulb, in fact, the glands and their ducts are so closely associated with the bulb that a critical examination of sections was required in order to distinguish them. They are large, multicellular, pyriform organs, somewhat irregular in shape and varying slightly in size. They do not extend out loosely into the coelom but are closely applied to the penial bulb. The ducts are very small and easily overlooked, the best view being found in sections made at right angles to the lumen of the atrium. At first sight, they appear to be large penial glands, but more careful examination shows that the staining reaction of the two groups of glands is not the same.

Spermatheca.—This species belongs to the group having long, prominent spermathecae which extend through a number of somites. The ectal opening occurs in the usual position in IV/V and is characterized by a conical thickening of the cuticula above the aperture and the absence of associated glands. Unlike many enchytræids, the spermathecae of this species occur entirely ventrad of the alimentary canal, and in all of the specimens examined, they cross over about midway of their length so that in the somites containing the terminations of these organs the ampulla on the right side really belongs to the left spermatheca, and the ampulla on the left to the right spermatheca. Diverticula are absent and it is difficult to determine the precise extent of the duct and the ampulla. However, each organ is usually present in V as a narrow duct, expanding in VI or VII to form the ampulla. Both organs end blindly and have no connection with the digestive tract. The terminations are distinctly distended and in the mature individuals contain a considerable quantity of spermatozoa. The two organs of the same individual vary somewhat in extent, usually one being shorter than the other. In

some instances, the spermatheca on one side extends into the posterior part of VIII while the opposite one ends in VII. None of the spermathecæ examined extend beyond VIII.

The writer pointed out in a previous publication ('16, pp. 99-100) that as judged from the literature, enlarged and greatly elongated spermathecæ, similar to the ones described above, have been found only in certain American species from the Pacific Coast region. At present, the list includes seven species described by Eisen ('05): *Mes. harrimani*, *Mes. setchelli*, *Mes. franciscanus*, *Mes. obscurus*, *Mes. maculatus*, *Mes. vegæ*, and *Mes. orca*. Possibly *Mes. asiaticus* Eisen should also be included. To this list should be added *Mes. gelidus* Welch and *Mes. altus*, n. sp. It appears that the spermathecæ of the latter differ from those possessed by any of the above-mentioned species in the total absence of diverticula. Aside from *Mes. orca* and *Mes. asiaticus* which have diminutive spermathecal diverticula, the other species have diverticula as well-developed and prominent organs. Further discussion of enlarged spermathecæ occurs in the writer's previous paper ('16, p. 100).

An interesting feature of the spermathecæ of this species is the crossing over described above. All of the specimens examined showed the same condition, indicating that it is apparently the normal form for the species. Since these organs end blindly and are not connected with the digestive tract, some variation in the position of the terminations with reference to the other internal organs might be expected. However, the fact that they extend through several somites separated by the usual septa indicates that probably this crossing over occurred when the organs were developing, rather than after their full length had been attained. This interpretation is supported by the fact that the crossing over seems to be constant in character. Additional support also appears in the discovery by Eisen ('05, pp. 102-104) that in some of the specimens of *Henlea guatemalæ* the spermathecæ cross over before effecting their independent union with the digestive tract, a condition which could have arisen only in connection with the development of the organs.

Henlea urbanensis Welch

This species was originally described by the writer ('14, pp. 134-140) from a single, sexually mature specimen, found near Urbana, Illinois, in the rich soil of undisturbed forest-land, and, up to the present date, nothing further was known as to its distribution. Through the courtesy of Miss Bessie R. Green, the writer has recently been able to study a collection of enchytræids which were collected in a limited locality on the shore of Yellow Bay, Flathead Lake, Montana, on July 20, 1914. These worms occurred in the moist earth under moss on the banks of a small stream located near the University of Montana Biological Station. They were also found on logs which had fallen into the stream. The surrounding region is wooded and has an elevation of about 3,000 feet. The stream is a typical mountain one, being clear, cold, and rather swift. This collection contained five completely mature specimens and five others in various states of immaturity. Critical examination of serial sections made from mature individuals revealed so close a correspondence with the description of the type specimen of *Henlea urbanensis* that they are without question the same species. Any of the deviations from the original description can easily be accounted for as variations within the same species. The following discussion of the chief morphological features will indicate these variations and extend the description as originally given.

External Morphology

The length of the mature specimens varies from 10 to 15 mm., the average being 12.5 mm. It will be noted that this dimension falls considerably below that of the type specimen, but a part of this discrepancy may be due to contraction of the animals during the killing and fixing process. It is also possible that the Montana specimens are somewhat smaller. In any case, this particular difference cannot be regarded as specially significant. The maximum diameter, which occurs in the clitellar region, is about 0.61 mm. The number of somites varies from 50 to 53, the average being 51.8. Owing to the lack of evidence as to the number of somites of the type specimen, no comparison of these data can be made. The color

of the alcoholic material is light yellowish to light brown. The prostomium is rounded on the tip, somewhat blunt, short, concave on the dorsal surface, and bears a distinct head pore at 0/I.

On the anterior and middle parts of the body, there are 4-8 setæ per bundle, 5-7 being more common, while on the posterior region, the number decreases to 2-4. All of the setæ of the body are approximately straight, both at the distal and proximal extremities. In connection with the reexamination of the type specimen from Urbana, it was discovered that the statement in the original description ('14, p. 135) that the proximal ends of the setæ are "distinctly bent" requires some modification since they are approximately straight in form, the outer setæ only of each bundle deviating from the strictly straight condition by bending very slightly away from the central axis of the bundle. The outer setæ of each bundle are longer and stouter than the inner ones, a contrast which recalls the condition in the genus *Fridericia*, although the difference is less than that usually found in the latter.

A well-developed clitellum occurs on XII-XIII and sometimes to some extent on the posterior part of XI. It is continuous around the body, showing practically no diminution of thickness on the ventral surface. The component cells are closely crowded together and in the thickest region are 5-6 times longer than thick. The clitellum on the type specimen corresponds exactly with those on the Montana specimens with the exception that its thickness is somewhat greater.

Internal Morphology

Lymphocytes.—The lymphocytes are large, broadly oval in shape, very numerous, and scattered throughout the whole body-cavity. Each is distinctly nucleated and is composed of a relatively large amount of granular cytoplasm. Although there is some variation in size and shape, there appears to be only one type. The maximum diameter varies from about 0.04 to 0.056 mm.

The above-mentioned characters apply equally well to the lymphocytes of the type specimen from Urbana. In a few somites of the latter, cephalad of the clitellum, they are so numerous that they almost completely fill the coelom.

Brain.—Every detail of the original description holds for the Montana specimens and no additional comment is required.

Peptonephridia.—In general structure, extent, and relation to the digestive tract, these organs do not differ to any degree from those of the type specimen. There is a slight variation in the number and size of the branches, which, however, cannot be regarded as very significant. They arise from the alimentary canal in V and extend caudad to VIII. Both dorsal and ventral organs are comparatively simple, apparently single and tubular. Sparse branching occurs at one or two points along their course.

Intestinal Diverticula.—Critical examinations of serial sections made in transverse and frontal planes show that the structure of the intestinal diverticula of the Montana material corresponds almost exactly with that of the same organs in the Urbana specimen. Since the latter was described in detail (Welch, '14, pp. 137-139), no morphological discussion will be given here. The paper just mentioned contains a structural comparison of some of the various intestinal diverticula which occur in species of *Henlea* and it is pointed out that, so far as could be judged from the literature, the morphology of the intestinal diverticula of *H. urbanensis* differs from that of any species then known. However, since that time, Friend ('15, pp. 203-204) has described, in some detail, the structure of the pair of diverticula occurring in *H. fragilis* which corresponds very closely to those of *H. urbanensis*, the only important differences being the absence of chloragog cells and the presence of a larger number of internal folds on the mesal side. A pair of diverticula are said to occur (Southern, '09, p. 146; Friend, '12, pp. 577-598) in VII or VIII in *H. hibernica* Southern, *H. attenuata* Friend, *H. heterotropa* Friend, *H. fridericioides* Friend, and *H. triloba* Friend, but the structure has not been described for any of them, making comparison impossible.

Dorsal Blood-vessel.—The dorsal blood-vessel arises in the extreme posterior part of VIII or the anterior part of IX and is distinctly enlarged at the origin. It is evident that there is not an exact correspondence with the position of origin as given for the type specimen but such slight variation is, no doubt, within the limits of a species.

Penial Bulb.—The structural detail of this organ corresponds so closely with the original description that only one or two variations deserve comment. In the Montana specimens, the cells composing the body of the bulb are not so distinctly differentiated into the three kinds previously described, although they appear to be represented. The series of cells arranged radially about the penial lumen is not as complete and the gland cells composing the dorsal part of the bulb differ but slightly from those of the ventral part.

Spermathecae.—The spermathecae lie in the usual position in V, the ectal opening of each being laterad in the intersegmental groove IV/V and the ental opening at the posterior part of V on the dorsal side of the digestive tract. Each opens independently into the latter. A distinct rosette of glands occurs about the ectal opening. Viewed as a whole, the organ shows no differentiation between the duct and the ampulla, having a maximum diameter of about 0.148 mm. near the ectal opening and gradually decreasing in size to the union with the digestive tract. An examination of sections of this organ shows that about midway of its length there is a distinct expansion of the lumen of the organ, probably representing the ampulla although its presence is not indicated externally. In other parts of the organ, the lumen is very fine. The presence of this expansion of the lumen indicates the extent of the duct and a typical set of measurements is as follows: length of duct, 0.435 mm.; length of expanded portion of lumen, 0.348 mm.; length of remainder of organ, 0.957 mm.; total length of ampulla, 1.305 mm.

It will be noted that the only difference between the spermathecae of the Montana and the Urbana material is the absence in the former of the slightly expanded union of the two organs just in advance of their fusion with the digestive tract. While all of the essential parts of a spermatheca are represented in these organs, nevertheless they appear to have a very limited capacity and are rather inconspicuous features of the internal morphology. At first sight, it might appear that these spermathecae are not completely developed, but in all of the sexually mature specimens examined, they were constant in shape and degree of development. Furthermore, they were found to contain masses of spermatozoa, indicating that they were at least functioning in the usual capacity of com-

pletely mature spermathecæ. Similar spermathecæ have been reported in *H. californica* Eisen and its two varieties, *monticola* and *helenæ*, and in *H. tenella* (Eisen). Certain other briefly described species appear to have similar spermathecæ.

Nephridia and Spermiducal Funnel.—These organs correspond to the previous description and require no comment here.

Affinities.—A critical examination of the literature shows that of the various species usually included under the genus *Henlea*, the following apparently approach *H. urbanensis* rather closely: *nasuta* (Eisen), *tenella* (Eisen), *californica* Eisen, *inuitata* Friend, *fragilis* Friend, and *fridericioides* Friend.

Nasuta fails to agree with *urbanensis* by possessing spermathecæ with distinct ampullæ and in having the structure of the ectal and ental walls of the intestinal diverticula quite similar. The writer has found nothing in *urbanensis* to correspond to the statement by Southern ('09, p. 146) concerning an Irish specimen of *nasuta*: "The single specimen obtained was very dark, each segment having several rows of irregular glands."

Tenella, an imperfectly described species from the Old World, seems to agree closely with *urbanensis* in all of the structures described except the small number of setæ and the possession of a spindle-shaped spermiducal funnel. A number of important structures are not mentioned.

Californica differs from *urbanensis* in having a narrow and pointed prostomium, no chloragog cells on the digestive tract or on the dorsal blood-vessel, the width of the brain exceeding the length, the presence of glands at the ectal opening of the spermathecæ, and the position of the intestinal diverticula in VII. Two varieties, *monticola* and *helenæ*, have been described for *californica* by Eisen but the above-mentioned differences hold for them also, except that the brain in *helenæ* is described as being almost square.

Inuitata (Friend, '13, pp. 83-84; '14, p. 136) has a single intestinal diverticulum ("bulb") and the salivary glands are "nephridia-like glands" between the second and third septal glands.

Fragilis seems to be very close to *urbanensis*, differing in the character of the spermathecæ, the former having well-developed ampullæ and each member of a pair is independent of the corre-

sponding one on the opposite side. The union with the digestive tract is described as incomplete, the ental end of the ampulla ending blindly in the wall-tissues of the tract. *Fragilis* also shows the structure of the ental and ectal walls of the intestinal diverticulum to be similar, and no chloragog cells occur on the coelomic surface of the latter. Chloragog cells are also absent from the first twenty to twenty-five somites.

Fridericioides also seems to bear considerable resemblance to the species under discussion. Although not completely described, the known details of internal and external anatomy indicate a difference in the presence of a well-defined ampulla on each spermatheca. Each spermatheca opens independently into the digestive tract and has a series of glands at the ectal opening. Friend ('12, p. 587) states that the septal glands sometimes consist of two pairs only. Three pairs are present in *urbanensis* in the usual position and all are well developed. However, it is not known how much weight can be attached to variation in these glands. The structure of the pair of intestinal diverticula is not described.

It will be noticed that some of the above-mentioned species, as judged from descriptions and figures, seem to resemble *urbanensis* rather closely. It is very possible that not all of these species are valid and the writer is inclined to expect that future revision based on more complete morphological data will place some of them in the synonymy. Some of the apparent differences or similarities may be the result of incomplete knowledge of variation within each species or of certain structural features which are important in diagnosis. The close agreement of the Montana specimens with the original type specimen from Illinois is of interest because of the wide separation of the two regions.

LITERATURE CITED

EISEN, G.

1905. Enchytræidæ of the West Coast of North America. Harriman Alaska Expedition, 12:1-166. 20 pl. New York.

FRIEND, H.

1912. British Enchytræids. IV. The Genus *Henlea*. Journ. Royal Micr. Soc., pp. 577-598. 11 figs.
1913. A Key to British *Henleas*. The Zoologist (4), 17:81-91.
1914. British Enchytræids. VI. New Species and Revised List. Journ. Royal Micr. Soc., pp. 128-154.
1915. Studies in Enchytræid Worms. *Henla fragilis* Friend. Ann. Applied Biol., 2:195-208. 6 pl.

SOUTHERN, R.

1909. Contribution towards a Monograph of the British and Irish Oligochæta. Proc. Royal Irish Acad., 27, Sec. B:119-182. 5 pl.

WELCH, P.S.

1914. Studies on the Enchytræidæ of North America. Bull. Ill. State Lab. Nat. Hist., 10:123-212. 5 pl.
1916. Snow-field and Glacier Oligochæta from Mt. Rainier, Washington. Trans. Am. Micr. Soc., 35:85-124. 4 pl.